

REMARKS/ARGUMENTS

In the Office action dated January 12, 2006, the Examiner withdrew the rejection of all claims in the Final Office action, and rejected the now-pending claims in light of newly discovered references, all of which issued long before the filing of this Application. Claim 1 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over newly applied U. S. Patent No. 5,812,742 to Hanyu, granted September 22, 1998, in view of U. S. Patent No. 6,072,590 to Sano *et al.*, granted June 6, 2000. Claims 1-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over '742 in view of '590, and further in view of previously applied U. S. Patent No. 5,777,757 to Karlsson *et al.*

In the Specification, no changes.

In the Claims, claims 1, 3, 8 and 13 are amended.

The Invention

The invention is fully described in the Preliminary Amendment which accompanied the RCE. At this point, what should be stressed is the difference between a multi-level halftone, as used in the output in the method of the invention, and a bitonal halftone, as described in the applied art. A bitonal halftone is a halftone resulting from a print engine which lays down a fixed amount of ink/toner for each pixel; a multi-level halftone results from a print engine which is able to vary the amount of ink/toner laid down for each pixel.

A conventional rendering process: follows the steps:
continuous tone image → two-tone processes → two-tone (bitonal) halftone image, such as the method of Hanyu.

The method of the invention follows the steps:

any halftone image → scan → continuous tone image → special multi-level processes → multi-level halftone image.

Other prior art second generation halftone process:

two-tone (bitonal) halftone image → scan → continuous tone image → descreening → continuous tone image → bitonal or multi-level halftone processes → bitonal or multi-level halftone image. Descreening is a difficult, slow process.

Rendering halftone image without the method of the invention or without descreening:

two-tone (bitonal) halftone image → scan → continuous tone image → bitonal or multi-level halftone processes → bitonal or multi-level halftone image with moirè, results in bad patterning

The Applied Art

U. S. Patent No. 5,812,742 to Hanyu describes a two-tone , or bi-tonal, process *vice* a multi-level halftone process. The described process has no relationship to making a second generation multi-level halftone image, and concentrates on smoothing “jaggies” as would appear in a facsimile or other coarse raster based process.

U. S. Patent No. 6,072,590 to Sano *et al.* incorporates a “supercell” halftone, which may gain more tone levels than available in a conventional halftone cell. The supercell halftone is used with angular screens.

U. S. Patent No. 5,777,757 to Karlsson *et al.* describes a traditional multi-level halftone process, which generates a halftone from an original image, not from an already halftoned image. It does not incorporate a second halftone process, and does nothing to eliminate interference between two halftones, which is a distortion in the form of a low frequency banding

called moirè. It uses a conventional threshold array which is divided into two or more classes.

The Claims

It is difficult to address the Examiner's rejection of the claims as obvious under 35 U.S.C. § 103(a), as none of the references perform the same task with similar results to Applicant's method of the invention, either taken alone or in combination. As previously noted, at length, in the description of the invention in the Preliminary Amendment, the method of the invention generates a second-generation halftone image, which is multi-level, from a previously halftoned image, and does so without inducing the interference pattern known as moirè. Initially, the two newly applied references have nothing to do with second-generation halftone images. '742 doesn't even address a multi-level halftoned image: it deals with a bitonal image. A careful reading of the '742 reference clearly shows that the word "halftone," as used in '742, generally describes a quality of a representation of a dot in a drawings figure, and is not used to describe a process used in the '742 method of the invention. The input to the '742 process is a bitonal image, not a multi-level halftone image, thus, an important element of all of the claims of the instant Application is missing: it is not possible to make a second generation multi-level halftone image from a first generation halftone image if there is no first generation halftone image. A two-tone image is not equivalent to a multi-level halftone image. To change '742 from a two-tone input to a multi-level halftone input would likely destroy the utility of the method of the invention.

'590 describes use of a supercell, col. 1, line 30 to col. 2, line 2 and Fig. 2. The entire reference describes using a supercell and varying a halftone screen angle, col. 4, line 21-39 and col. 4, line 63 to col. 5, line 10. The remainder of the reference is based on the use of a supercell and changing screen angles, which are not used in Applicant's method of the invention.

While there is no specific mention in the Specification that a supercell is not used, and that screen angles are not changed, one of ordinary skill in the art would recognize this to be the case. If one were to eliminate the supercell and change of screen angle form '590, the method of the invention of the reference would cease to function, thereby destroying the utility of the invention.

'757 is a conventional multi-level halftone process, and the only reference to even contain the words "interference" and "moirè" in the specification.

With the preceding background, Applicant will attempt to address the issues raised by the Examiner in the most recent Office action. While Applicant does not believe it is required to amend the claims to recite that the second generation halftone image is multi-level, Applicant has amended the independent claims to clarify that the method of the invention results in a second generation, multi-level, halftoned image, in order to advance prosecution of this Application.

Claim 1 requires "...selecting an image which has been halftoned...." The portion of '742 cited for this element clearly recites that a two-tone image is the input, and is thus "selected." The claim further requires that "...each halftone dot includes at least one pixel therefor;..." The applied portion of '742 describes shading in the dots representing pixels in the drawing figures of the patent in a two-tone image as being "halftoned." Thus, there is no teaching or suggestion in the applied portion of the reference that each halftone dot includes at least one pixel therefor. So, if anything, '742 teaches that one may represent pixels with halftoned dots, however, this does nothing to teach or suggest the required element of Applicant's claim.

Continuing, the next element of claim 1 requires "...determining a number of tone levels required for each pixel of the selected halftoned image;..." The applied portion of '742 is 9/36-41 and 9/51-57, however, if the text spanning 9/35-67 is carefully read, it will be clear to the Examiner

that the discussion presented by '742 is describing a technique of taking an average of bitonal pixels spanning a 12x12 array of pixels, thus, the requisite "tone levels" do not exist, as that term would be understood by one of ordinary skill in the art, because the discussion deals solely with bitonal pixels, *i.e.*, not continuous tones as are present when dealing with the halftone images which are the subject of the method of the invention of the instant Application. The next element of claim 1 is "...arranging the number of tone levels in a set of tone levels;..." The portion of '742 applied as teaching this limitation, in reality, describes the organization of a group of magnified dots, which are not tone levels, and are not in a set of tone levels. Again, we are dealing with a bitonal halftone image. The high-frequency halftone cell size is allegedly the result of organizing dots for a *second* halftone operation into 1x1, 2x2, *etc.* cells, however, the necessary element of a second generation multi-level halftoned image is missing.

The most significant flaw in the Examiner's argument comes with the alleged teaching of the next element: "...scanning the selected halftoned image to produce a second generation multi-level halftoned image, which retains the original halftone dots and pixels therein;..." There is no halftoned image in '742 to scan, *i.e.*, the scanned image in '742 is a document to faxed; there is no resultant second generation multi-level halftoned image, and, even if the first two elements were present, '742 magnifies and manipulates the pixels to smooth jaggies, thus *NOT* retaining the original multi-level halftone dots and pixels therein. 9/17-10/7. The portion of '742 applied by the Examiner merely recites the arrangement of bitonal dots in a 12x12 array. The same argument applied to the next element of claim 1, namely, "...reproducing, for each pixel in the second generation multi-level halftoned image, a pixel tone level;..." Although the Examiner contends that scanning by a fax machine produces a first generation

halftone and the reception by a second fax machine generates a second generation halftoned image, the Examiner's interpretation is not supported by the applied reference, which conducts all of the operations described in '742 in the receiving unit - and merely smooths jaggies before providing the output hardcopy. Applicant is not aware of any facsimile machine which uses a multi-level halftone screen in any phase of its normal operation, which is the manner in which a multi-level halftoned image is generated. Applicant requires that pixel tone levels for each pixel be selected from a set of tone levels, *etc.* The applied portion of '742 describes averaging over pixel sets, which does not teach or suggest the claim limitation.

Whether or not '590 teaches or suggests the remaining element is irrelevant, *i.e.* not material, to the examination of Applicant's claims, as '590 uses the context of a supercell with variable angle halftone screens, which are simply not present in Applicant's method of the invention, and which, if removed from '590, render that invention inoperable. It is not understood how the variable angle halftone screen of '590 could or would or ought to be incorporated with the facsimile machine of '742, so there does not seem to be any support for the Examiner concocted combination.

The Examiner's contention that Hanyu ('742) is analogous art is not well taken: '742 deals with imaging, however, it does not deal with multi-level halftone imaging, and does not convert a first generation halftone image into a second generation multi-level image; '742 uses an image or printed page or signal received from another facsimile machine as input, and smooths the jaggies found in the usual facsimile rendering. '742 does nothing to minimize halftone processing artifacts, because it does not provide a multi-level halftone images as output. It is significant that neither '742 nor '590 have the words "second generation," "interference" or "moiré" anywhere in

the specification claims or drawings. The use of these terms is to be expected when dealing with production of a second generation multi-level halftoned image with reduced interference and moirè. The lack of these terms in the applied references is because neither of these references are related to reducing interference in a second generation multi-level halftone image. Claim 1, having no elements thereof taught or suggested by the applied art, is clearly allowable over that art.

Claims 2-5 are allowable with their allowable parent claim(s).

Claim 6 recites that number of tone levels is fifteen plus white. The reasons for this is found in the Specification, page 9, line 21 to page 10, line 2, because this is the maximum number of tone levels perceptible by the HVS. The applied portion of '742 is the oft used "averaging" technique, which initially determines a maximum tone level (singular) "P," which is a function of the average of the 12x12 array. So, until one knows the value of P, it doesn't matter what size pixel array is used, it will not inherently result in Applicant's 15 levels of gray plus white; it will result in a multi-tone level of indeterminate value, unless the unlikely average of the 12x12 array is "1." None of this has anything to do with selecting the maximum number of tone levels to be fifteen levels of gray plus white based on the HVS: if $P \neq 1$, some other number of tone levels will be used. Claim 6 is therefor allowable over the applied art, because the applied art does not teach or suggest specifically setting the number of tone levels to fifteen levels of gray plus white.

Claim 7 is allowable with its allowable parent claim.

Claim 8 is allowable for the reasons set forth in connection with claim 1, and because claim 8 includes an additional limitation of preserving original halftone dot amplitude, as

described in the Specification, page 8, lines 2-10. As noted in the previously provided discussion of the invention, and in the discussion of the applied art, where a halftoned image is descreened, the original dot density, treated as a signal amplitude, is not preserved. Applicant's method of the invention, using multi-step threshold reading of the original halftoned image allows the original halftone dot amplitude to be preserved. This is neither taught nor suggested by either applied reference, nor by a combination thereof, in spite of the Examiner's contention. The Examiner acknowledges that '742 does not teach nor suggest this limitation. The portions of '590 do not teach nor suggest the limitations of claim 8 not found in claim 1. '757, contrary to the Examiner's assertion that original dot amplitude is preserved, as required by claim 8, teaches that the intensity of a halftone cell increases, which must certainly require a change in amplitude of the pixels therein, '757, 6/5-16, thus changing original dot amplitude. Claim 8 is allowable over the prior art of record.

Claim 9 is allowable for the reasons set forth in connection with claim 6.

Claims 10-12 are allowable with their allowable parent claim(s).

Claim 13 includes the limitations of claim 8 and an additional limitation which requires the setting of a multi-level threshold. This feature of the invention is described in the Specification, beginning on page 7, and is shown in Figs 1-4. There is no teaching nor suggestion of applying threshold values to an existing multi-level halftone image to generate a second generation multi-level halftone image. The Examiner applies the now infamous '742, 9/60-67, aka, "the averaging algorithm." Once again, the value of P is determined from the 12x12 bitonal array, and multiple-tone levels determined for the resultant bitonal dot group. Thus, a multiple-tone level is set, but there is no tone level (singular) set for each pixel in the second generation

multi-level halftone, as required by the claim language, for all the usual reasons, *e.g.*, lack of a second generation multi-level halftone images and magnification of the pixels of the image in '742 *vice* retaining the pixels of the first generation halftone image. Claim 13 is therefore allowable over the cited art.

Claims 14-17 are allowable for the reasons set forth in connection with claims 9-12.

In light of the foregoing amendment and remarks, the Examiner is respectfully requested to reconsider the rejections and objections stated in the Office action, and pass the application to allowance. If the Examiner is not inclined to allow all claims as currently presented in this Application, the Examiner should conduct a new search and provide art which is in the field of reducing interference in second generation halftoned images, which the Examiner has yet to do. Such an action should not be a final action, as there have been no significant changes to the claims herein since the previous submission. If the Examiner has any questions regarding the amendment or remarks, the Examiner is invited to contact the undersigned.

Provisional Request for Extension of time in Which to Respond

Should this response be deemed to be untimely, Applicants hereby request an extension of time under 37 C.F.R. § 1.136. The Commissioner is hereby authorized to charge any

additional fees which may be required, or credit any over-payment to Account No. 22-0258.

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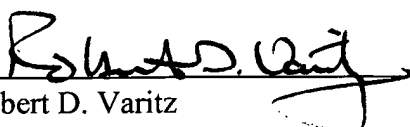
Respectfully Submitted,

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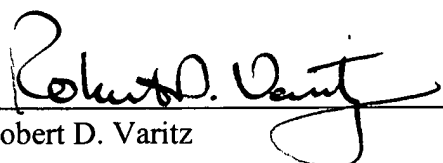
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I hereby certify that the attached RESPONSE TO OFFICE ACTION UNDER 37 C.F.R. § 1.111 is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to:

MS Amendment
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